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Case Report

Percutaneous Cervical Neurostimulation Trials in Patients with Prior Cervical De-compressive Laminectomy: A Case Series

Michael Patterson[1*], Nestor Tomycz[2]

[1]Department of Pain Medicine and Anesthesiology, Allegheny Health Network, McMurray, USA;[2]Department of Neuroscience, Allegheny General Hospital, Pittsburgh, USA

ABSTRACT

In clinical pain medicine, there are situations in which an open surgical trial is the only way to provide a patient the opportunity to receive neuro-stimualtion. Such situations can include the location of prior surgical treatment, spinal hardware, and epidural scarring.

Presented here are two cases in which each patient was informed, by experienced interventional pain physicians, that a surgical trial was the only possible approach for them to receive that treatment. Within our institution, and through collaboration between the neurosurgical and pain medicine teams, a differing second opinion was offered.

Despite limitations in access to the epidural space, and based on the distribution of symptoms a percutaneous trial was successfully offered to each of them. As a result, these patients were able to trial this treatment before committing to additional surgical intervention.

Keywords: Percutaneous trial; Clinical pain medicine; Surgical treatment; Laminectomy

INTRODUCTION

Current expert consensus recommends the use of a SCS trial prior to implantation of this therapeutic modality [1]. This trial process is used as a screening tool to predict interventional success. A trial of neuro-modulation is also considered best practice because it can identify the ideal location for the therapy in a less invasive way than the surgical alternative.

At our institution, we attempt to limit open trials to cases where a percutaneous lead is not feasible. Situations such as prior surgery, spinal hardware, and scarring can increase the technical difficulty of a percutaneous placement. These clinical scenarios can result in the interventional pain medicine physician or neurosurgeon to suggest an open trial. Percutaneous SCS trial failures due to technical aspects have previously been reported in approximately 2% to 7% of cases [2]. Open placement has been associated with higher rates of pain at the implant site and wound complications [3]. To minimize occurrence of these known complications and to improve patient selection, a percutaneous trial is preferred by many in the field of neurostimulation.

Holsheimer demonstrated that hand, forearm, and upper arm coverage can be achieved with low cervical and upper thoracic placement [4]. In these locations, the probability of paresthesia can be approximately 50% or higher. Therefore, even with limited access to the posterior cervical epidural space, coverage is still possible in cases involving the upper extremity.

CASE PRESENTATION

Case 1

GB is a 68 year old with a history of cervical myelopathy who, within a period of three months, underwent surgical treatment twice. The initial surgery was an Anterior Cervical Discectomy Fusion (ACDF) at C5-6 that failed to improve the symptoms. This was followed by a posterior laminectomy at C5-6. Following the decompression, there were no objective signs of ongoing cord compression. Signal change within the cord consistent with myelomalacia was still present. After surgical intervention, there was persistent intractable bilateral upper extremity pain.

To address the pain, initially the patient received several non-operative treatments including two separate cervical epidural steroid injections and an intra-articular glenohumeral injection. Medication trials included tramadol, oxycodone, gabapentin, tizanidine, and medical marijuana. None of the above helped to reduce the symptoms. Neurosurgery recommended a neuro-stimulation trial, which was discussed with Pain Management

Correspondence to: Patterson M, Department of Pain Medicine and Anesthesiology, Allegheny Health Network, McMurray, USA, E-mail: Michael.Patterson@ahn.org

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whose initial assessment was that the individual was a suboptimal candidate for neurostimulation due to the prior surgical history.

A subsequent Pain Medicine consultation was obtained, and a percutaneous trial was offered. Two Octrodes were placed as cephalad as the anatomy would allow. For this patient, the top contact reached the bottom of the C6 vertebral body. The top 4 contacts of each lead were utilized for pain coverage. The program utilized provided coverage across the scapular region, the chest, and down both arms/forearms/hands. This pain mapping pattern covered the areas of concern (Figure 1).

The trial resulted in 75% reduction of the persistent pain symptoms which improved the patient's daily functioning. Additionally, sleep/wake cycle disturbances that were associated with the pain resolved. Ultimately, the patient returned to neurosurgery for implantation of a paddle lead.

Case 2

PH is a 56 year old with a history of cervical radiculopathy and myelopathy. The patient's symptoms required a C3 through C5 decompression with posterior fusion. This intervention improved the patient's gait and hand clumsiness but sensory complaints in the upper extremities persisted and were reported to be burning in nature. On examination, there was allodynia present in both upper extremities.

Non-operative treatments following surgery to address the persistent pain included opioid analgesia, methocarbamol, Soma, duloxetine, gabapentin, and medical marijuana. Interventional treatments included failed cervical medial branch nerve radio-frequency ablation and cervical epidural steroid injection. Neurosurgery requested evaluation by Pain Management for neurostimulation. The initial assessment was that a neurostimulation trial was not feasible due to posterior cervical spine scarring.

Neurosurgery believed that the patient's symptoms were secondary to complex regional pain syndrome, and requested a second opinion on the viability of a percutaneous trial.

Since the distribution of positive sensory symptoms was limited to the upper extremities, a percutaneous trial was believed to be possible during the second pain medicine consultation. The treatment was offered and accepted by this patient. Two Octrodes were placed to the bottom of the C5 vertebral body. The patient used only one program during the trial, utilizing the top 4 contacts on each lead. Utilization of this array resulted in bilateral upper extremity coverage from the shoulders down to the fingers bilaterally (Figure 2).

The result of the trial included was a near complete reduction of persistent pain. Associated with this pain reduction was improved independence in Activities of Daily Living (ADLs) and extended ADLs, such as driving and shopping. Based on the outcome of the trial, the patient was referred back to neurosurgery for implantation of a paddle lead.

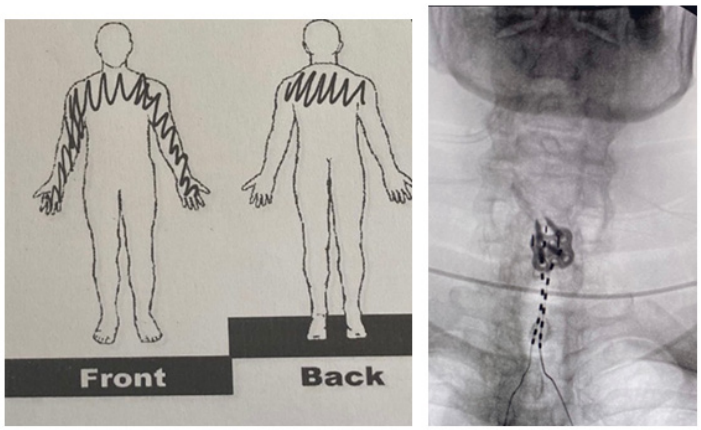

Figure 1: Trial synopsis report demonstrating the coverage pattern, and the final lead position.

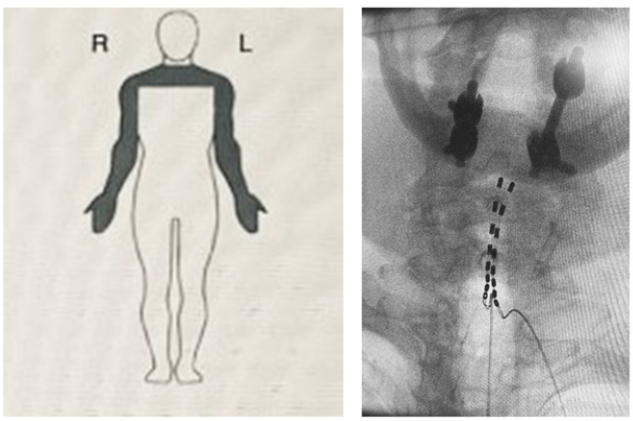

Figure 2: Trial synopsis report demonstrating the coverage pattern and the final lead position.

RESULTS AND DISCUSSION

Within the field of neurostimulation there is still ongoing debate regarding the necessity of a neuro-stimulator trial. This debate is based on the cost effectiveness of a potentially redundant procedure. However, a trial remains the treatment standard, and is viewed as a less invasive option to determine if a patient is a suitable candidate for this therapy. A trial also identifies the optimal location for any future implantable neurostimulation leads.

Specifically for the cases presented, both patients had received significant prior cervical spine surgery. A trial with neuro-stimulation in these types of cases can mean more than just exposure to a potentially beneficial therapy, it can also mean avoidance of additional, potentially unsuccessful, surgical interventions and the subsequent possibility of additional scarring and pain.

In certain clinical situations, percutaneously placed SCS leads can be technically challenging. Laminectomy defects represent one of those challenges; however, the presence of those defects alone does not serve as an absolute contraindication for a percutaneous SCS trial. As this case series demonstrates, the distribution of symptoms is a more accurate indicator of a successful SCS trial.

In both cases, the predominate symptoms were located in the upper extremities. Prior work has revealed that accesses to the high cervical levels are not required to obtain coverage in the arms and locations more distal. Probability of coverage for those regions remains high in the low cervical/high thoracic regions. Therefore, patient selection for implantable neurostimulation in these situations can occur through a percutaneous trial as opposed to an open surgical trial.

CONCLUSION

We report here two patients with prior surgical history of cervical de-compressive laminectomy who subsequently had successful percutaneous neurostimulation trials. Each individual had symptoms of persistent cervical/upper extremity radicular pain. In both instances, referrals were made to inventional pain management physicians by neurosurgery for consideration of percutaneous spinal cord stimulator trials to address persistent pain. After initial assessment, the patients were informed that percutaneous Spinal Cord Stimulation (SCS) was not a viable option and were then referred back to neurosurgery for an open paddle trial. Following a second pain medicine evaluation it was determined they could feasibly undergo a percutaneous trial. Despite limitations, including the presence of laminectomy deficits, percutaneous SCS trials were offered to both. Both achieved 75% or greater pain relief during a 7 day trial with improved function. They then returned to neurosurgery for definitive SCS implantation.

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